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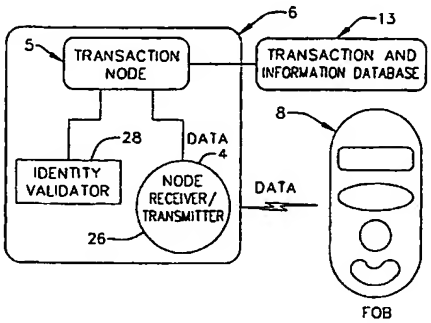

(57) Abstract: A system for transmitting and recording the transfer of electronic funds to a payment acceptor includes a personal data unit (8) and transaction node (5). The personal data unit (8) includes a microprocessor (20) having a data storage structure (21) storing an electronic funds balance connected to a data transmitter (26). The transaction node (5) includes a node receiver connected to the payment acceptor. Upon receiving a signal from the data transmitter (26), the node receiver signals receipt of electronic funds to the payment acceptor which in turn, debits of credits the electronic funds received in exchange for goods or services. In an optional embodiment, the system includes a transaction and information database for tracking transactions and, optionally, storing identity validation data (28) to verify the identity of users transacting electronic funds. A transaction hub (11) is optionally used to exchange electronic funds for cash or credit.

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SYSTEM AND METHOD FOR CASHLESS TRANSACTIONS

Related Application Data

The present application claims the priority of U.S. Provisional Application Serial No. 60/231,393, entitled "Safecash System," filed September 8, 2000 by Applicants herein.

Field of the Invention

The present invention relates to an electronic funds and data management system and apparatus for the secure storage, retrieval, transmission and tracking of electronic funds, transactions, and customer data.

Background of the Invention

Coins are unclean and cumbersome to handle. Cash, tokens and scrip, the most common alternatives to coins used in casinos for the play of casino games, quickly suffer from wear and tear. Furthermore, the mechanical devices associated therewith need continuous maintenance and are prone to failure. Thus, the replacement of cash and coin handling through the use of electronic funds has been a goal of many in the gaming industry and other institutions and business.

The most common electronic funds transfer systems currently available consist of a magnetic card used in conjunction with a magnetic card reader. Typically, the owner of the electronic funds accesses and transfers the electronic funds from a remote location by swiping the card through the card reader and entering a predetermined code

or customer Personal Identification Number ("PIN") into the card reader. This system is commonly implemented in Automatic Teller Machines ("ATMs"), debit card transaction systems, and credit card transaction systems.

Another type of electronic funds transfer system includes an access control system to control and charge access to various fee-based activities such as amusement rides, arcade games, cruise ships, and the like. A magnetic card is coupled to a central processing station and database that creates, stores and verifies customer account files to determine availability of credit. Pluralities of types of credit are used and the computer issues either approval or disapproval to each transaction based upon the credit or funds availability of a particular customer in the system.

In the casino gaming industry, there have been proposals and prior art references discussing implementing electronic fund transfer systems into gaming machines. For example, prior art references propose retrofitting gaming machines with a read/write device that can read a credit or debit card to transfer electronic tokens or gaming credits from a remote bank account to the gaming machine. Some such systems further include embodiments in which any remaining credits in the gaming machine may be transferred back to the player's remote bank account. However, it is well known in the art that these systems have not been implemented on a wide scale because of gaming regulations, banking regulations, and concerns over security, disavowance of debt, compulsive gambling, and the like.

Other prior art systems in the gaming industry include systems that utilize magnetic identification cards that are read into a tracking system. In such systems,

payoffs are typically made by printing a voucher redeemable at the casino change booths.

For example, U.S. Patent No. 4,575,622, discloses a pre-paid card for arcade games. Players deposit a quantity of funds in exchange for a magnetic card storing an identifier. The quantity of funds is entered into a data record stored in a data center. The data center is networked with a plurality of card readers. When the card is swiped through a reader, the data center determines the quantity of tokens stored for the card. If the data center determines that the tokens available are sufficient for actuation of the game, the game attached to the reader is activated. As the tokens are used, the balance stored at the data center is depleted. When the balance reaches zero, the data center blocks activation of a game in response to swiping the card.

This system, the system shown in U.S. Patent No. 5,265,874 to Dickenson, et al., as well as any other system in which electronic funds or credits are stored in central remote accounts, are commonly referred to as "value-stored accounts." These systems typically utilize magnetic-stripe cards encoded to permit a user to access to a centrally stored account and transfer electronic funds.

Such value-stored accounts, however, provide the potential for theft and illegal manipulation. Possession of a person's magnetic-stripe card and the PIN may be used to transfer substantial amounts of money in a very short time. If the money is used for gambling and is lost, even if the electronic thief is caught, it may no longer be possible to recover the money. This sort of theft occurs in connection with systems that store the electronic funds in the remote computer system itself rather than in a portable unit.

Likewise, general-purpose debit or credit cards and smart card type data units are made of plastic or similar material. Those cards are used in association with magnetic card readers, which can only be accessed by sweeping the card through a groove or by inserting the card into a slot thereby causing fast wear and tear of the card and the interface components due to friction.

Another prior art approach utilizes so-called "smart cards." Such systems are sometimes referred to as "value-stored card" systems (as opposed to "value-stored account" systems discussed above). In a smart card system, the account balance is stored directly on a memory structure on the smart card. As electronic funds are used, the account balance stored is decreased. However, these systems suffer from drawbacks. For example, issues such as security, authentication, and difficulty in recharging an account balance surround such systems.

It therefore can be seen that there is a need in the art for a secure system for transferring electronic funds in exchange for goods and services in a variety of settings.

Summary of the Invention

A system for transmitting and recording the transfer of electronic funds to a payment acceptor, such as those used on gaming machines, vending machines, arcade games, cash registers, and the like, includes at least two components, a personal data unit and a transaction node. The personal data unit includes a microprocessor having a data storage structure storing at least an electronic funds balance and a data transmitter connected to the microprocessor. Optionally, the personal data unit additionally includes a display to display at least the electronic funds balance and an input actuator

to control the quantity of funds transferred. In a further optional embodiment, the personal data unit includes an input receiver communicating with the microprocessor to receive signals for processing and storage at the data storage structure, as described in more detail below.

The transaction node includes a node receiver connected to the payment acceptor. The data transmitter may communicate with the transaction node in any manner known in the art including mutual induction, infrared signals, sonic signals, visible or invisible light or electromagnetic signals, or the like. Upon receipt of a signal representing a portion or all of the electronic funds balance from the data transmitter, the transaction node communicates receipt of electronic funds to the payment acceptor. In turn, the payment acceptor debits or credits the electronic funds received at the transaction node in exchange for goods or services. As the data transmitter transmits a signal representing a portion or all of the electronic fund balance, the microprocessor updates the electronic funds balance stored in the data storage structure. Optionally, the transaction node also includes a node transmitter to transmit a signal to the input receiver to transfer electronic funds balance back to the personal data unit.

In a further embodiment, the system may further include a transaction and information database communicating with the transaction node. In such an embodiment, the data storage structure additionally stores a unit identifier, optionally a unique unit identifier, and the data transmitter transmits the unit identifier to the node receiver in addition to the electronic funds. This unit identifier can be correlated to a particular customer record or anonymous identifier depending on the application use. The transaction node, in turn, communicates the quantity of electronic funds and the

unit identifier to the transaction and information database for storage therein. Additionally, in an optional embodiment, the transaction node also includes an identity validator, such as a keypad for entering a personal identification number ("PIN") or a device for measuring biometric data such as fingerprints or the like. In such an embodiment, the transaction and information database additionally stores identity validation data. When the identity validator receives identity input, and the payment acceptor receives the electronic funds only if the identity input matches the identity validation data.

In an embodiment in which the personal data unit includes an input receiver, an optional transaction hub may be provided. The transaction hub includes a hub transmitter communicating with the input receiver such that the electronic funds balance stored in the data storage structure may be increased or decreased by a selected quantity. In this manner, the electronic funds balance may be selectively increased or decreased as electronic funds are added to or redeemed from the personal data unit. For example, the transaction hub may include a data entry terminal connected to the hub transmitter such that the electronic funds balance stored in the data storage structure may be increased or decreased by an amount entered at the data entry terminal. Similarly, a currency handler may be connected to the hub transmitter such that the electronic funds balance stored in the data storage structure may be increased or decreased by an amount inserted into or dispensed from the currency handler. In yet another optional embodiment, the hub transmitter communicates with an automatic teller machine linked to a bank server. In such an embodiment, the electronic funds balance stored in the data storage structure

may be increased or decreased by an amount withdrawn from or deposited to the bank server via the automatic teller machine.

The method of using the system begins by storing at least an electronic funds balance in the data storage structure at the personal data unit. In an optional embodiment, the personal data unit includes an input receiver and the electronic funds balance is initially transmitted to the personal data unit using the transaction hub or transaction node described above.

Electronic funds are used for payment at payment acceptors by transmitting a signal, such as by mutual induction, infrared signal, sonic signal, or the like, representing a portion or all of the electronic funds balance from the data transmitter to a node receiver. Optionally, the signal is encrypted. At the personal data unit, the microprocessor updates the electronic funds balance stored in the data storage structure to reflect the transfer of electronic funds. In an optional embodiment including a display, a confirmation message may be displayed on the personal data unit.

The transaction node signals receipt of the funds to the payment acceptor. The payment acceptor debits or credits the electronic funds received in exchange for goods or services. Optionally, the node includes a node transmitter and the personal data unit includes an input receiver such that the payment acceptor may transmit a portion or all of any remaining balance back to the personal data unit. The node may also optionally print a record of each transaction.

In an optional embodiment including a remote transaction and information database communicating with transaction nodes, a unit identifier may be transmitted by the personal data unit to the transaction receiver so that each transaction, including the

unit identifier and amount of electronic funds transacted, may be recorded at the database. In a further optional embodiment, identification input is entered at an identity validator at the transaction node before the electronic funds are accepted. If the identification input matches identity validation data stored at the transaction and information database, the electronic funds are accepted. Similarly, in another optional embodiment, the transaction and information database stores a status for each personal data unit. Prior to accepting electronic funds, the status is checked to determine whether the personal data unit is active or has been deactivated. If the personal data unit is active, the electronic funds are accepted. In an optional embodiment including a display, a confirmation message may be displayed on the personal data unit.

As an alternative optional security measure, the data storage structure may store a defined deactivation time. The microprocessor tracks the time and upon reaching the defined deactivation time, the microprocessor blocks the transmission of electronic funds from the personal data unit.

To exchange electronic funds for cash or credit, that is, add electronic funds to a personal data unit or redeem electronic funds from a personal data unit, transaction hubs may be provided. These transaction hubs may employ many different methods for conducting the exchange including entering at a data entry terminal the quantity of cash or credit exchanged, receiving or dispensing currency from a currency handler, and communicating with an automatic teller machine linked to a bank server to increase or decrease the electronic funds balance stored in the data storage structure by the selected amount withdrawn from or deposited to the bank server via the automatic teller machine.

It is an object of the present invention to provide an electronic system for the secure storage, retrieval, transmission and tracking of electronic funds and customer data.

Brief Description of the Drawings

FIG. 1 shows a front view of a personal data unit according to an embodiment of the present invention;

FIG. 2 shows a block diagram of a personal data unit, transaction node, and transaction and information database according to an embodiment of the present invention;

FIG. 3 shows a block diagram of a personal data unit, transaction hub, and transaction and information database according to an embodiment of the present invention;

FIG. 4 shows a block diagram of a network of transaction hubs and transaction nodes networked to a transaction and information database according to an embodiment of the present invention;

FIG. 5 shows a block diagram of a transaction node connected to a gaming machine according to an optional embodiment of the present invention;

FIG. 6 shows a block diagram of a personal data unit according to an embodiment of the present invention;

FIG. 7 shows a block diagram of a transaction hub connected to an automatic teller machine according to an optional embodiment of the present invention

FIG. 8 shows a flowchart of a method according to an embodiment of the present invention.

Description

Reference is now made to the figures wherein like parts are referred to by like numerals throughout. Referring first to FIGS. 1 and 6, a personal data unit 8 includes a microprocessor 20 having a data storage structure 21 storing at least an electronic funds balance. The data storage structure 21 may take any form known in the art including read-only memory ("ROM"), random access memory ("RAM"), electrically programmable read-only memory ("EPROM"), electrically erasable programmable read-only memory ("EEPROM"), electrically alterable read-only memory ("EAROM"), magnetic storage, optical storage or the like. In an optional embodiment, the data storage structure 21 is readable/writable/rewritable. The personal data unit 8 may optionally include light emitting diodes to visually cue the user to the transfer of data, an input actuator 3, such as a button or series of buttons, to, for example, actuate displays, input amounts, actuate transfers, and the like, and a display 2, optionally a liquid crystal display, for displaying data, prompts, input, and the like. The personal data unit 8 may optionally include a power source 25, such as a battery, solar cell, or the like. In one optional embodiment, is a power source that is recharged by induction, thereby eliminating the need for replacing batteries.

The personal data unit 8 further includes a data transmitter communicating with the microprocessor 20. It is contemplated that the data transmitter could be compatible with other remote transmitters such as car remotes or the like and include a manual or

automatic switch to control the signal transmitted. In a further optional embodiment, an input receiver 22 also communicates with the microprocessor 20. Optionally, the input receiver 22 and data transmitter are combined into a transceiver 22 as shown in FIG. 6.

With reference to FIG. 2, a transaction node 5 includes a node receiver 4 that receives signals from the data transmitter 22. The transaction node 5 interfaces with a payment acceptor 6, such as a gaming machine, vending machine, cash register, toll booth, arcade game machine, laundry machine, or other application associated with the sale of goods or services, such that the payment acceptor 6 may be alerted to the receipt of a signal representing electronic funds at the transaction node 5. For example, FIG. 5 illustrates a transaction node 5 adapted for a gaming machine. Referring again to FIG. 2, in an optional embodiment, the transaction node 5 further includes a node transmitter 26. In one optional embodiment, for example, the node receiver 4 and node transmitter 26 are combined into a mutual induction transceiver data converter and interface.

With reference to FIGS. 2 and 4, in an optional embodiment, transaction nodes 24 communicate with a transaction and information database 13 through a hardwire or wireless interface. In such an embodiment, the transaction and information database 13 may be utilized for various optional tasks including recording transactions occurring at the transaction nodes 24, creating redundant records, along with the record stored at the personal data unit 8, of electronic funds balances, and storing identity verification data. To maintain the transaction and information database 13, a terminal with direct access to the transaction and information database 13 may be provided.

For example, to provide a level of security in the transfer of electronic funds, the transaction node 5 may include an identity validator 28. The identity validator 28 could

be any identity validating device known in the art such as a keypad for entry of a password or personal identification number ("PIN") or biometric device for fingerprint scanning, retina scanning, facial recognition, or other biometric verification. In such an optional embodiment, the transaction and information database 13 includes identity validation data. The identity validator 28 communicates with the transaction and information database 13 and compares the identity input at the identity validator 28 with the validation data stored at the transaction and information database 13. The payment acceptor 6 only receives the electronic funds if the identity input and validation data match.

In a further embodiment of the system of the present invention, shown in FIG. 3, a transaction hub 11 may be provided. The transaction hub 11 includes a hub transmitter 32 and hub receiver 31 that communicates with the input receiver 22 and data transmitter 22 of the personal data unit 8. In this fashion, the transaction hub 11 may be used to increase or decrease the electronic funds balance stored in said data storage structure 21 by a selected quantity. Thus, the transaction hub 11 may be used to exchange cash or credit for electronic funds or vice versa. It is contemplated that the exchange of cash or credit could be performed in a variety of ways.

For example, the transaction hub 11 may optionally include a data entry terminal 10, such as a keyboard, such that the amount of electronic funds transacted can be entered at the keyboard for transmission from the hub transmitter 32 to the input receiver 22. Alternatively or additionally, the transaction hub 11 may optionally include a currency handler. In such an optional embodiment, currency may be inserted into the currency handler and electronic funds transmitted to the personal data unit 8. In yet

another optional embodiment, shown in FIG. 7, the transaction hub 11 may communicate with an automatic teller machine ("ATM") 34 linked to a bank server. In this optional embodiment, the user withdraws from or deposits to his or her account at the bank server via the ATM 34. The hub transmitter 32 then transmits the quantity of electronic funds transacted to the personal data unit 8. The transaction hub 11 may optionally include a printer 12 to print a record of the electronic funds transaction. In an optional embodiment including a transaction and information database 13, such as that shown in FIG. 4, the transaction hub 11 may also record the electronic funds transaction at the transaction and information database 13. In any of the above-described embodiment, it is contemplated that the transaction hub 11 may encode and dispense personal data units 8 to users who have not yet been issued one. Similarly, it is contemplated that the transaction hub 11 could incorporate an identity validator like that used at the transaction node 5 to validate the user's identity when electronic funds are transacted.

Referring to FIG. 8, in use, a user obtains 40 a personal data unit 8, for example, by being issued one by an attendant or obtaining one from a transaction hub 11 dispenser, and adds electronic funds to the personal data unit 8. It is contemplated that the electronic funds could be purchased using cash or credit or that the funds could be promotional in nature, such as for a slot tournament. In such an optional embodiment, it is not necessary for the customer to be present at issuance of an personal data unit 8. In such an optional embodiment, electronic funds and consumer data may be loaded into a personal data unit 8 and mailed or given to a customer for promotional or marketing purposes. Alternatively, the personal data unit 8 may be issued with a pre-determined

quantity of electronic funds and, optionally, an deactivation time as described below, but without customer data.

In an embodiment including a transaction hub 11, a user obtains 42 electronic funds, such as by exchanging cash or credit, at the transaction hub 11 and the hub transmitter 32 transmits a signal to the input receiver 22 at the personal data unit 8. In an embodiment requiring identity validation, the identity validation data could also be entered at the transaction hub 11 and stored at the transaction and information database 13 and, optionally, the data storage structure 21.

For example, the user could insert money into a currency handler or withdraw money using an ATM 34 and receive the electronic funds directly to the personal data unit 8 through a signal from the hub transmitter 32 to the input receiver 22. Similarly, an attendant could receive cash or credit from the user and enter the amount to be credited into a data entry terminal 10 for transfer to the personal data unit 8. In an optional embodiment, the signal transmitted to the personal data unit 8 is encrypted prior to transmission and decrypted upon receipt. In an optional embodiment, the encryption/decryption algorithm includes a public key/private key encryption method in which the private key is stored only in the transaction nodes 24 and transaction hubs 11 and the public key is a PIN known to the user and stored only in the personal data unit 8 and the transaction and information database 13.

In a similar fashion, a user could redeem 66 electronic funds stored in a personal data unit 8 at a transaction hub 11 by transmitting a signal from the data transmitter 22 at the personal data unit 8 instructing the transaction hub to redeem a selected quantity of electronic funds. The transaction hub 11 then dispenses 76 currency, credits a bank

or credit account, or prompts an attendant to pay the user. The microprocessor 20 decreases 64 the electronic funds balance stored at the data storage structure 21 to reflect the redemption of the electronic funds. As with the transaction node 5, an identity validator could be incorporated into the transaction hub 11. In such an optional embodiment, the user could be required to validate his or her identity through input 68 of identity input data. As discussed above, the identity input could take many forms including a PIN or biometric data, such as fingerprints or the like. The identity input is compared 72 to identity validation data stored at the transaction and information database 13 and the redemption is allowed 76 or denied 74. In an optional embodiment utilizing a transaction and information database 13, a photograph of the user could also be stored for additional security during electronic funds transactions. In an alternate optional embodiment, identity verification can be validated using the unit identifier of the personal data unit, as described below, in cases where the personal data unit was issued without customer identification information.

Once an electronic funds balance has been stored to the data storage structure 21 of the personal data unit 8, the personal data unit 8 is given to a user. In an optional embodiment including a display 2, the electronic funds balance and other relevant information may be displayed to the user.

The user may then transfer all or a portion of the electronic funds balance to various payment acceptors 6, such as payment acceptors 6 interfaced with vending machines, gaming machines, arcade games, cash registers, toll booths, or the like. To transfer funds, the transmits 44 a signal from the data transmitter 22 of the personal data unit 8 representing the desired quantity of funds to the transaction node 5 interfaced

with the payment acceptor 6. In an optional embodiment, the user uses input actuators 3 to select the amount of electronic funds to transfer and initiate the transfer. Alternatively, the transfer may automatically initiate when the personal data unit 8 is within a predetermined range of a transaction node 5. In yet another embodiment, the transfer may be initiated when the personal data unit 8 is within a predetermined range of a transaction node 5 and an input actuator 3 is actuated. In an embodiment including a display and/or light emitting diodes, the display may display a message or the light emitting diodes may flash to alert the user to the transfer of electronic funds.

The transaction node 5 communicates receipt 54 of the electronic funds to the payment acceptor 6 and the payment acceptor 6 debits or credits 58 the received electronic funds in exchange for goods and services. Also, the microprocessor 20 of the personal data unit updates 56 the electronic funds balance stored at the data storage structure 21 to reflect the transfer of funds. As discussed above, the transaction node 5 may optionally communicate with a transaction and information database 13 to create a redundant record of the transaction. In such an embodiment, the personal data unit 8 may additionally transmit a unit identifier assigned to, and stored in, the personal data unit 8 to associate the record with a particular account in the transaction and information database. The unit identifier is optionally a unique identifier. The unit identifier may be associated with a specific user profile or, in an embodiment in which the personal data unit 8 is distributed without customer information encoded therein, the unit identifier may be associated with an anonymous account. In a further embodiment, upon receiving the unit identifier, the transaction node 5 may optionally check the access allowed to the user as stored at the transaction and information database 13. That is,

personal data units 8 may be limited in their use in certain ways so that, for example, certain personal data units 8 could be used for arcade games but not for gambling.

Optionally, the payment acceptor 6 may require validation of the user's identity prior to receiving the electronic funds. In such an embodiment, identity validator 28 receives identity input 46. The transaction node 5 communicates to the transaction and information database 13 to compare 50 the identity input with identity validation data 48 stored at the transaction and information database 13. If the identity input matches the identity validation data, the electronic funds are received 54; if not, the transfer is denied 52.

In an optional embodiment, a user may conduct a series of transactions 60 at the transaction node or transfer 62 electronic funds from a transaction node 5 back to the personal data unit 8. In such an embodiment, the transaction node 5 transmits a signal to the input receiver 22 of the personal data unit 8. In response to this signal, the microprocessor 20 updates 64 the electronic funds balance stored at the data storage structure 21.

For additional security, a number of security measures can be instituted in the method of the present invention. For example, the transaction and information database 13 may include a status for each personal data unit 8 indicating whether the personal data unit 8 is active or deactivated. A number of events could then be used to determine the status of a specific personal data unit 8. For example, if the personal data unit 8 is reported lost or stolen, the personal data unit 8 could be deactivated. Similarly, a defined deactivation time could be specified. When the deactivation time is reached, the status could be changed to deactivated. In such an embodiment, the payment

acceptor would be prevented from receiving electronic funds from any personal data unit 8 that is determined by the transaction node 5 to be deactivated.

The system and method of the present invention could also be adapted for multi-property use. In one such an optional embodiment, the personal data unit 8 could include multiple location settings. In this embodiment, separate accounts could be maintained for each location. The user selects the location or the personal data unit 8 senses the location. Electronic funds transactions taking place after location selection are tracked in an account for that specific location. In an alternate multi-property system, the personal data unit 8 could be used a multiple locations using a single account.

While certain embodiments of the present invention have been shown and described it is to be understood that the present invention is subject to many modifications and changes without departing from the spirit and scope of the claims presented herein.

I CLAIM:

1. A system for transmitting and recording the transfer of electronic funds to a payment acceptor, comprising:

a personal data unit including a microprocessor having a data storage structure storing at least an electronic funds balance and a data transmitter connected to said microprocessor to update the electronic funds balance stored in said data storage structure as said data transmitter transmits a signal representing a portion or all of said electronic fund balance; and

a transaction node having a node receiver connected to said payment acceptor, said transaction node communicating receipt of electronic funds to said payment acceptor upon receipt of a signal representing a portion or all of said electronic funds balance from said data transmitter, said payment acceptor debiting or crediting the electronic funds received at said transaction node in exchange for goods or services.

2. The system of claim 1 further comprising a transaction and information database communicating with said transaction node, wherein said data storage structure additionally stores a unit identifier and said data transmitter transmits said unit identifier to said node receiver in addition to said electronic funds, said transaction node communicating the quantity of electronic funds and said unit identifier to said transaction and information database.

3. The system of claim 2 in which said transaction node additionally comprises an identity validator to receive identity input and said transaction and information database

additionally stores identity validation data, said payment acceptor receiving said electronic funds only if the identity input matches the identity validation data.

4. The system of claim 1 wherein said personal data unit further comprises a display.

5. The system of claim 1 wherein said personal data unit further comprises an input actuator.

6. The system of claim 1 wherein said data transmitter and said node receiver communicate to one another via mutual induction.

7. The system of claim 1 wherein said data transmitter and said node receiver communicate to one another via infrared signals.

8. The system of claim 1 wherein said data transmitter and said node receiver communicate to one another via high frequency sonic signals.

9. The system of claim 1 wherein said personal data unit further comprises an input receiver connected to said microprocessor.

10. The system of claim 9 further comprising a transaction hub including a hub transmitter communicating with said input receiver such that said electronic funds

balance stored in said data storage structure may be increased or decreased by a selected quantity.

11. The system of claim 10 wherein said transaction hub further comprises a data entry terminal connected to said hub transmitter such that said electronic funds balance stored in said data storage structure may be increased or decreased by an amount entered at said data entry terminal.

12. The system of claim 10 wherein said transaction hub further comprises a currency handler connected to said hub transmitter such that said electronic funds balance stored in said data storage structure may be increased or decreased by an amount inserted into or dispensed from said currency handler.

13. The system of claim 10 wherein said transaction hub further comprises an automatic teller machine linked to a bank server, said automatic teller machine connected to said hub transmitter such that said electronic funds balance stored in said data storage structure may be increased or decreased by an amount withdrawn from or deposited to said bank server via said automatic teller machine.

14. The system of claim 9 wherein said transaction node further comprises a node transmitter communicating with said payment acceptor, said node transmitter transmitting a signal to said input receiver to increase or decrease the electronic funds balance stored in said data storage structure by a selected quantity.

15. A system for transmitting and recording the transfer of electronic funds to a payment acceptor, comprising:

a personal data unit including a microprocessor having a readable/writable/rewritable data storage structure storing at least an electronic funds balance and a unit identifier, an input receiver connected to said microprocessor, and a data transmitter connected to said microprocessor to update the electronic funds balance stored in said data storage structure as said data transmitter transmits a signal representing a portion or all of said electronic funds balance;

a transaction node including a node receiver connected to said payment acceptor, said transaction node communicating receipt of electronic funds to said payment acceptor upon receipt of a signal representing a portion or all of said electronic funds balance and a unit identifier from said data transmitter, said payment acceptor debiting or crediting the electronic funds received at said transaction node in exchange for goods or services;

a remote transaction and information database communicating with said transaction node, said transaction node communicating the quantity of electronic funds and said unit identifier to said transaction and information database; and

a transaction hub including a hub transmitter communicating with said input receiver such that said electronic funds balance stored in said data storage structure may be increased or decreased by a selected quantity.

16. The system of claim 15 in which said transaction node additionally comprises an identity validator to receive identity input and said transaction and information database

additionally stores identity validation data, said payment acceptor receiving said electronic funds only if the identity input matches the identity validation data..

17. The system of claim 15 wherein said transaction node further comprises a node transmitter communicating with said payment acceptor, said node transmitter transmitting a signal to said input receiver to increase or decrease the electronic funds balance stored in said data storage structure by a selected quantity.

18. The system of claim 15 wherein said personal data unit further comprises a display.

19. The system of claim 15 wherein said personal data unit further comprises an input actuator.

20. The system of claim 15 wherein said data transmitter and said node receiver communicate to one another via mutual induction.

21. The system of claim 15 wherein said data transmitter and said node receiver communicate to one another via infrared signals.

22. The system of claim 15 wherein said data transmitter and said node receiver communicate to one another via high frequency sonic signals.

23. The system of claim 15 wherein said transaction hub further comprises a data entry terminal connected to said hub transmitter such that said electronic funds balance stored in said data storage structure may be increased or decreased by an amount entered at said data entry terminal.

24. The system of claim 15 wherein said transaction hub further comprises a currency handler connected to said hub transmitter such that said electronic funds balance stored in said data storage structure may be increased or decreased by an amount inserted into or dispensed from said currency handler.

25. The system of claim 15 wherein said transaction hub further comprises an automatic teller machine linked to a bank server, said automatic teller machine connected to said hub transmitter such that said electronic funds balance stored in said data storage structure may be increased or decreased by an amount withdrawn from or deposited to said bank server via said automatic teller machine.

26. A method for transmitting and recording the transfer of electronic funds to a payment acceptor, comprising:

providing a personal data unit including a microprocessor having a readable/writable/rewritable data storage structure, and a data transmitter connected to said microprocessor;

providing a transaction node including a node transmitter, said transaction node in communication with said payment acceptor;

storing at least an electronic funds balance at said data storage structure;

said data transmitter transmitting a signal representing a portion or all of said electronic funds balance to said node receiver at said transaction node;

said transaction node communicating receipt of electronic funds to said payment acceptor upon receipt of said signal;

said microprocessor updating the electronic funds balance stored in said data storage structure as said data transmitter transmits said signal; and

said payment acceptor debiting or crediting the electronic funds received at said transaction node in exchange for goods or services.

27. The method of claim 26 further comprising providing in said personal data unit an input receiver connected to said microprocessor.

28. The method of claim 27 further comprising:

providing in said transaction node a node transmitter communicating with said payment acceptor; and

said node transmitter transmitting a signal to said input receiver to increase or decrease the electronic funds balance stored in said data storage structure by a selected quantity.

29. The method of claim 27 further comprising:

providing a transaction hub including a hub transmitter communicating with said input receiver; and

transmitting a signal from said hub transmitter to said input receiver to increase or decrease the electronic funds balance stored in said data storage structure by a selected quantity.

30. The method of claim 29 further comprising:

providing in said transaction hub a data entry terminal connected to said hub transmitter;

exchanging cash or credit for electronic funds;

entering at said data entry terminal the quantity of cash or credit exchanged; and

transmitting a signal from said hub transmitter to increase said electronic funds balance stored in said data storage structure by an amount entered at said data entry terminal.

31. The method of claim 30 further comprising:

redeeming a portion or all of said electronic funds balance stored at said data storage structure; and

the microprocessor decreasing said electronics funds balance stored in said data storage structure by the amount redeemed.

32. The method of claim 29 further comprising:

providing in said transaction hub a currency handler connected to said hub transmitter;

exchanging currency for electronic funds by inserting currency into said currency handler; and

transmitting a signal from said hub transmitter to increase said electronic funds balance stored in said data storage structure by an amount inserted into or dispensed from said currency handler.

33. The method of claim 32 further comprising:

redeeming a portion or all of said electronic funds balance stored at said data storage structure;

dispensing currency from said currency handler in the amount redeemed; and

the microprocessor decreasing said electronics funds balance stored in said data storage structure by the amount redeemed.

34. The method of claim 29 further comprising:

providing in said transaction hub an automatic teller machine linked to a bank server, said automatic teller machine connected to said hub transmitter;

withdrawing or depositing to said bank server a selected amount; and

transmitting a signal from said hub transmitter to increase or decrease said electronic funds balance stored in said data storage structure by the selected amount withdrawn from or deposited to said bank server via said automatic teller machine.

35. The method of claim 29 further comprising said transaction hub encrypting said signal to increase or decrease said electronic funds balance prior to transmission by said hub transmitter.

36. The method of claim 26 further comprising:

providing in said personal data unit a display; and

displaying at said display the electronic funds balance stored in said data storage structure.

37. The method of claim 26 further comprising:

providing in said personal data unit an input actuator; and

selecting a portion of said electronic funds balance stored in said data storage structure for transfer using said input actuator.

38. The method of claim 26 wherein said data transmitter and said node receiver communicate to one another via mutual induction.

39. The method of claim 26 wherein said data transmitter and said node receiver communicate to one another via infrared signals.

40. The method of claim 26 wherein said data transmitter and said node receiver communicate to one another via high frequency sonic signals.

41. The method of claim 26 further comprising:

providing a remote transaction and information database communicating with said transaction node;

assigning a unit identifier to said personal data unit;

storing said unit identifier at said transaction and information database;

storing said unit identifier at said data storage structure;

said data transmitter transmitting said unit identifier to said node receiver; and

said transaction node communicating the quantity of electronic funds received and said unit identifier to said transaction and information database.

42. The method of claim 41 further comprising:

providing an identity validator in said transaction node;

storing identity validation data at said transaction and information database;

inputting identity input at said identity validator;

comparing said identity input with said stored identity validation data; and

said payment acceptor receiving said electronic funds only if the identity input matches the identity validation data.

43. The method of claim 42 wherein said identity validation data include a personal identification number.

44. The method of claim 42 wherein said identity validation data include biometric data.

45. The method of claim 41 further comprising:

storing at said transaction and information database a status associated with each unit identifier, said status indicating whether said personal data unit associated with said unit identifier is active or deactivated;

upon receipt of a unit identifier, checking the status associated with said received unit identifier; and

said payment acceptor receiving said electronic funds only if said status indicates said personal data unit is active.

46. The method of claim 26 further comprising printing a record of the electronic funds received at said transaction node.

47. The method of claim 26 further comprising said microprocessor encrypting said signal representing a portion or all of said electronic funds balance prior to transmission by said data transmitter.

48. The method of claim 26 further comprising:

said data storage structure storing a defined deactivation time;

said microprocessor tracking the time; and

upon reaching the defined deactivation time, said microprocessor preventing the transmission of electronic funds from said personal data unit.

49. The method of claim 41 further comprising said data storage structure being pre-loaded with an electronic funds balance prior to issuance to a user, said transaction and information database storing no personal user information.

FIG. 1

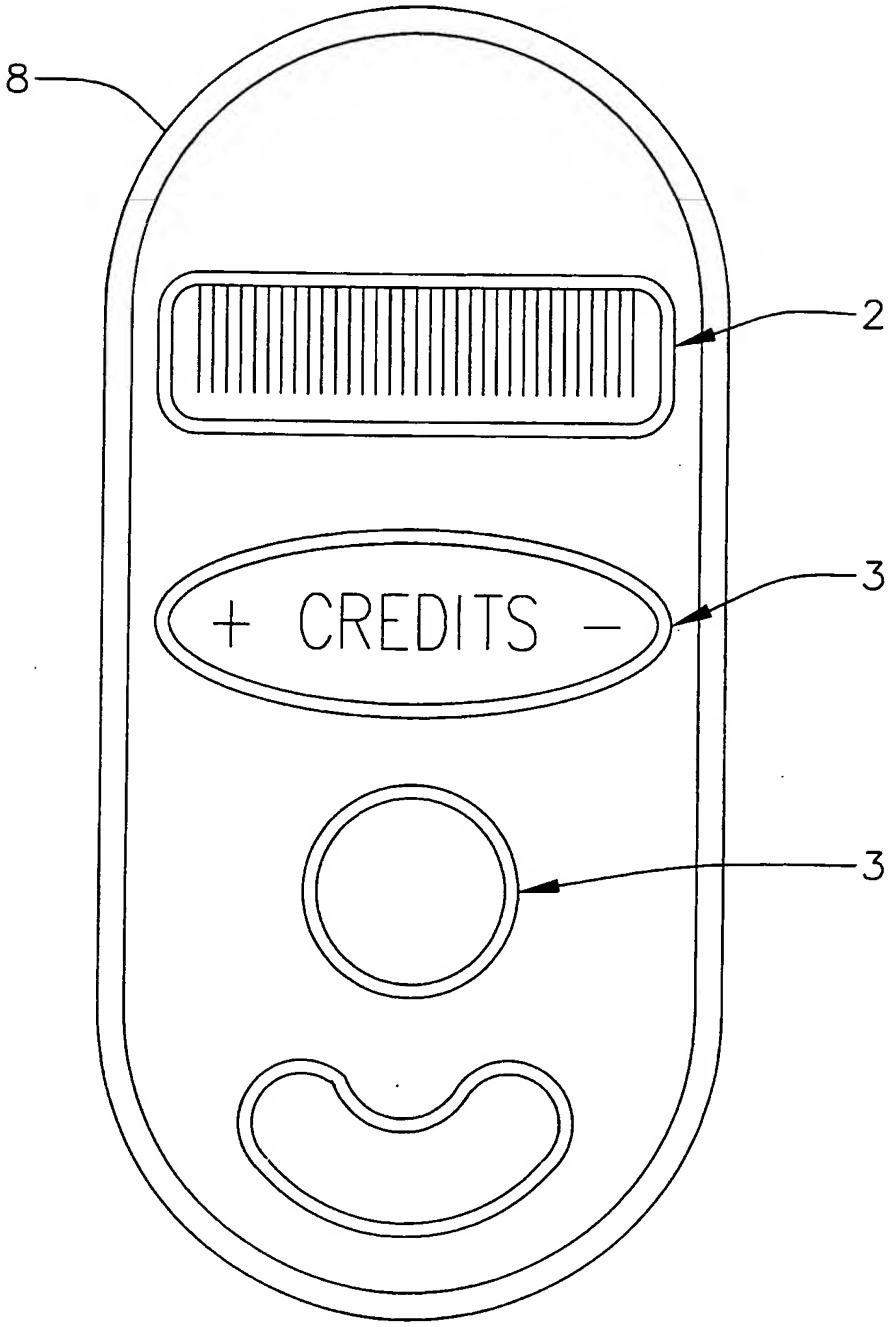


FIG. 2

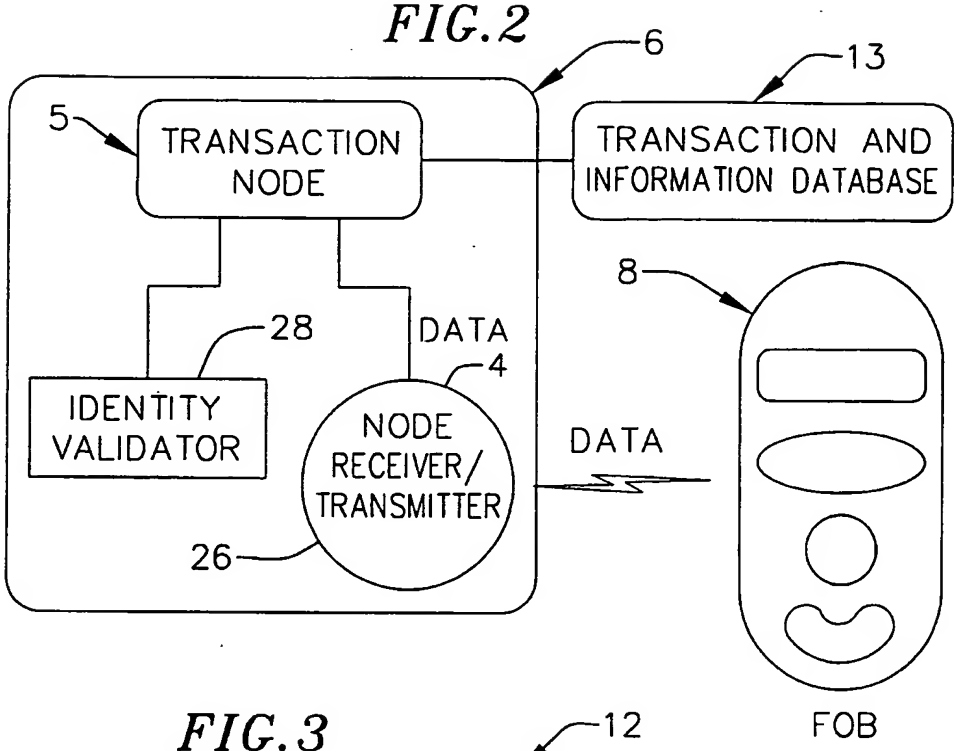
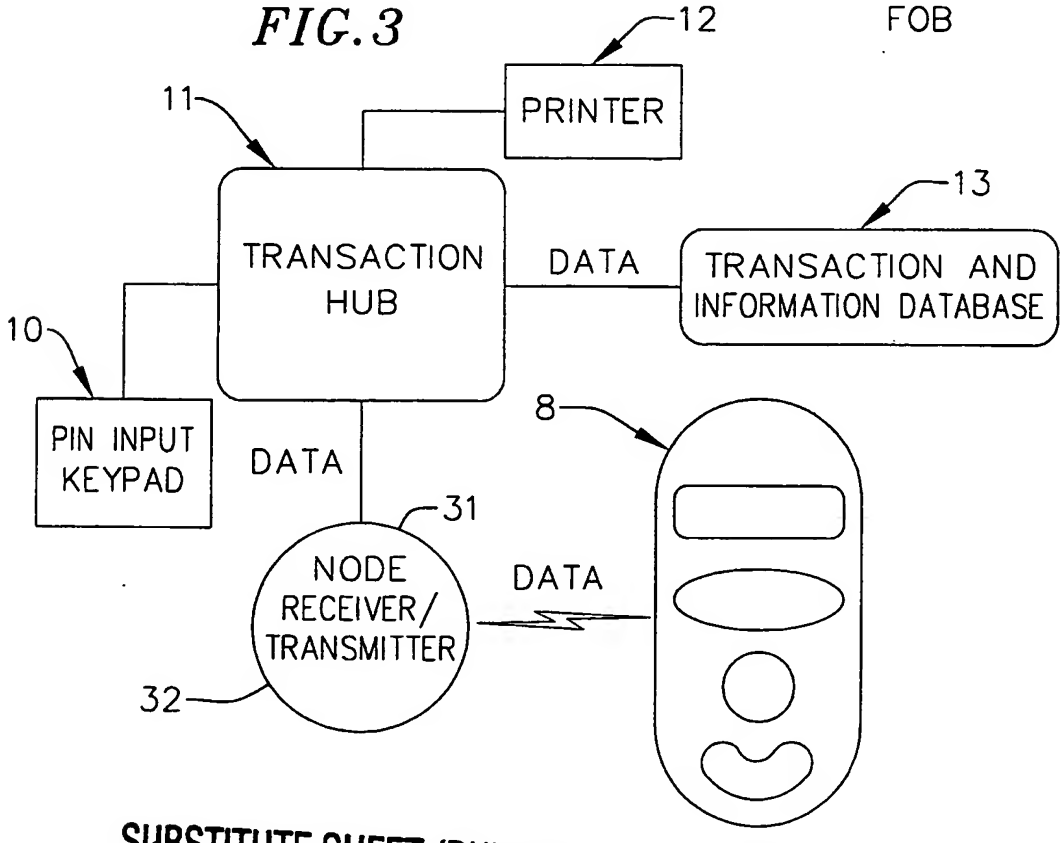

6
13
5
TRANSACTION NODE
TRANSACTION AND INFORMATION DATABASE
8
28
DATA
4
IDENTITY VALIDATOR
NODE RECEIVER/ TRANSMITTER
DATA
26
FOB

FIG. 3


12
PRINTER
11
TRANSACTION HUB
DATA
13
TRANSACTION AND INFORMATION DATABASE
10
8
PIN INPUT KEYPAD
DATA
31
NODE RECEIVER/ TRANSMITTER
DATA
32
FOB

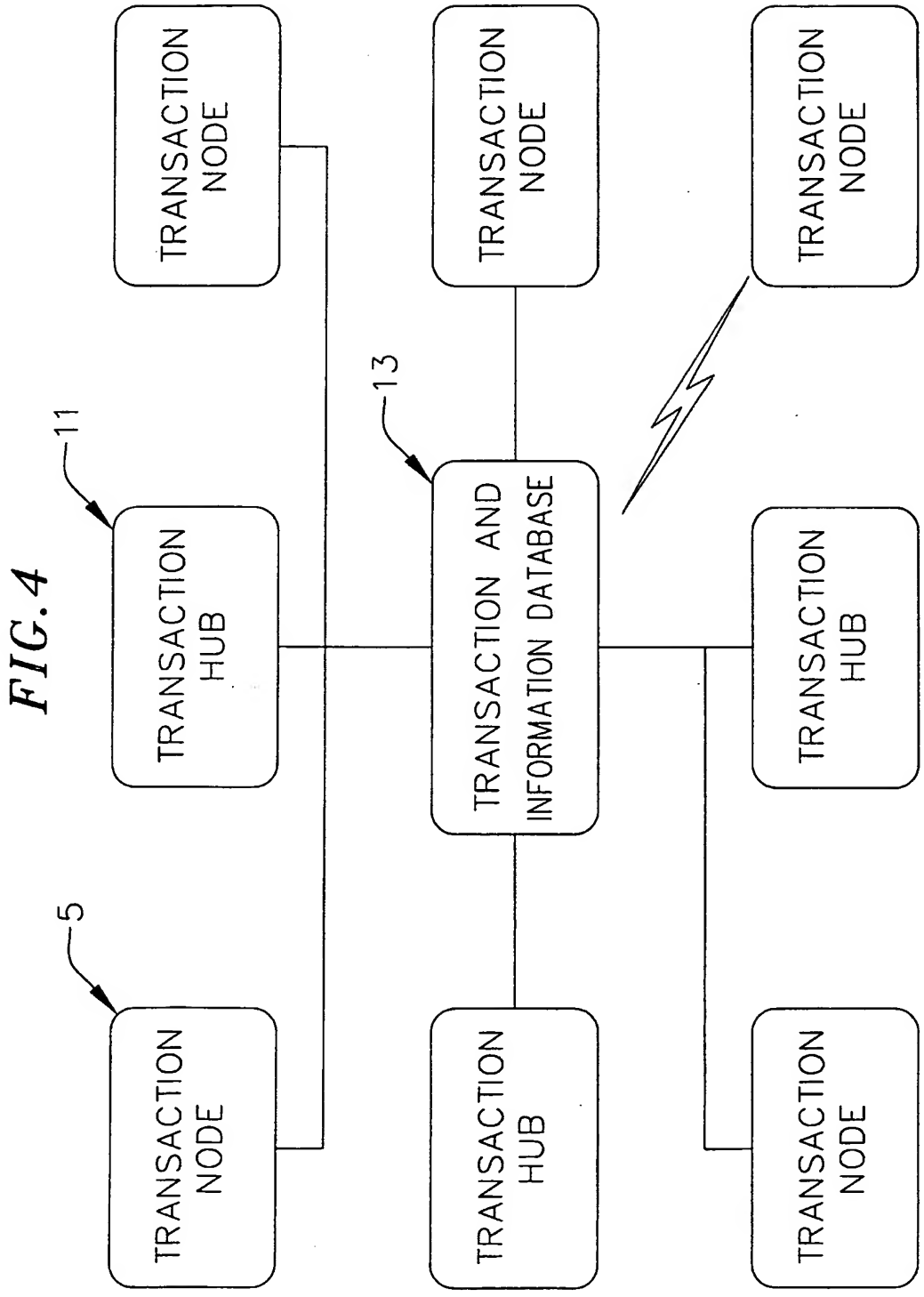
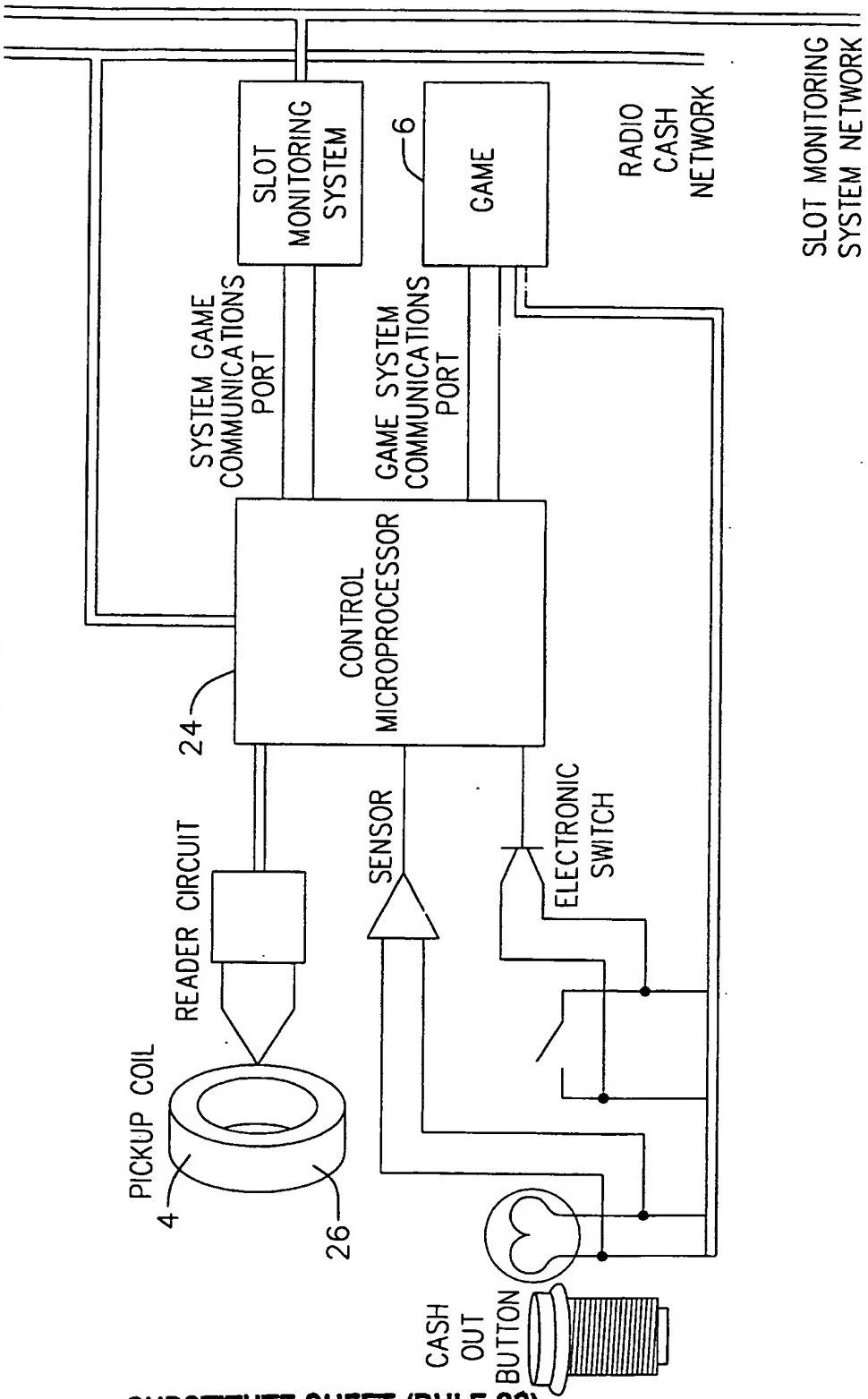

TRANSACTION NODE
TRANSACTION NODE
TRANSACTION NODE
11
13
TRANSACTION HUB
TRANSACTION AND INFORMATION DATABASE
TRANSACTION HUB
5
TRANSACTION NODE
TRANSACTION HUB
TRANSACTION NODE

FIG. 4

FIG.5


SLOT MONITORING SYSTEM NETWORK
RADIO CASH NETWORK
SLOT MONITORING SYSTEM
6
GAME
SYSTEM GAME COMMUNICATIONS PORT
GAME SYSTEM COMMUNICATIONS PORT
CONTROL MICROPROCESSOR
24
READER CIRCUIT
SENSOR
ELECTRONIC SWITCH
PICKUP COIL
4
26
CASH OUT BUTTON

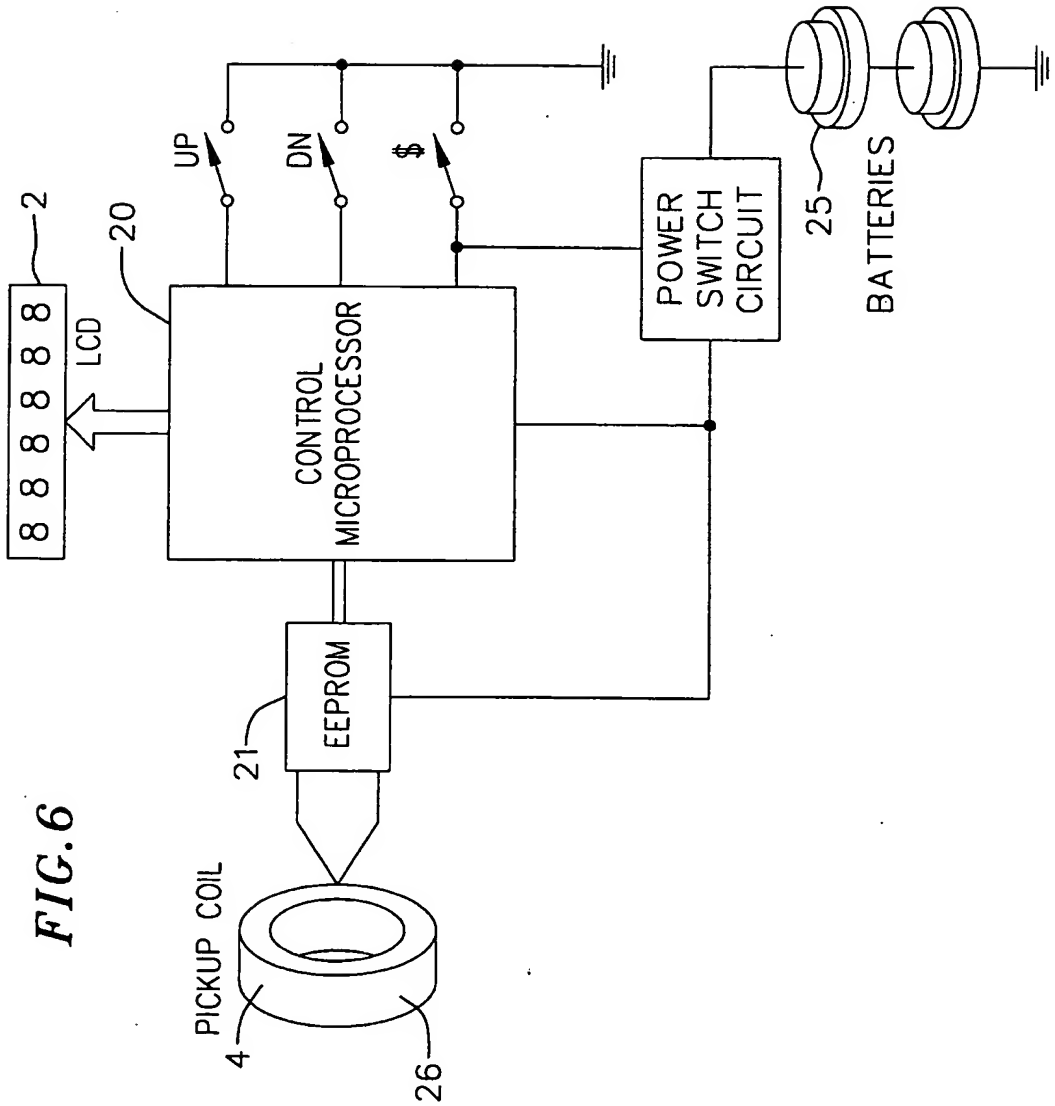
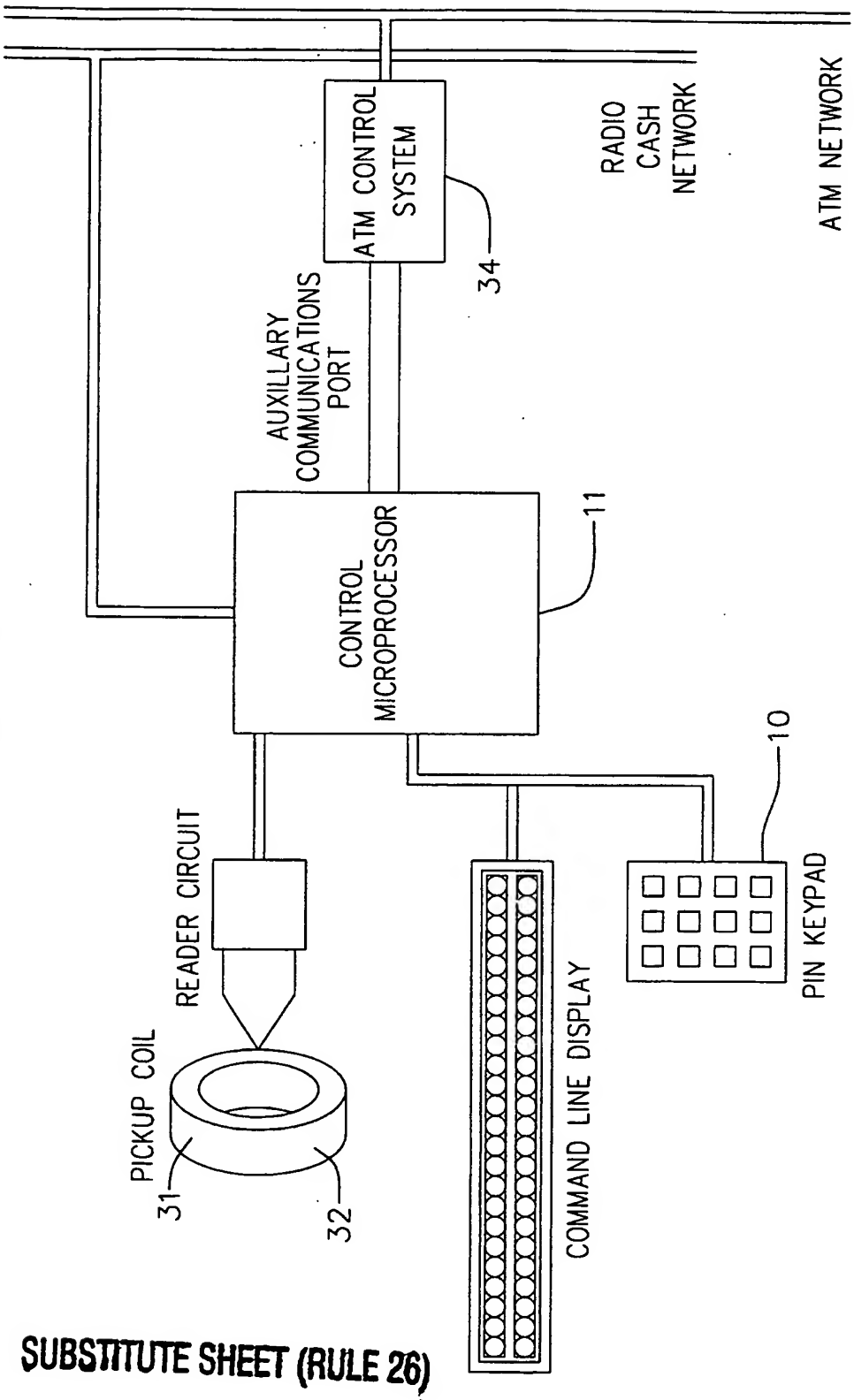

UP
DN
$
2
20
8 8 8 8 8 8
LCD
CONTROL MICROPROCESSOR
POWER SWITCH CIRCUIT
25
BATTERIES
21
EEPROM
PICKUP COIL
4
26

FIG. 6

FIG. 7


ATM NETWORK
RADIO CASH NETWORK
ATM CONTROL SYSTEM
34
AUXILLARY COMMUNICATIONS PORT
CONTROL MICROPROCESSOR
11
10
PIN KEYPAD
COMMAND LINE DISPLAY
READER CIRCUIT
PICKUP COIL
31
32

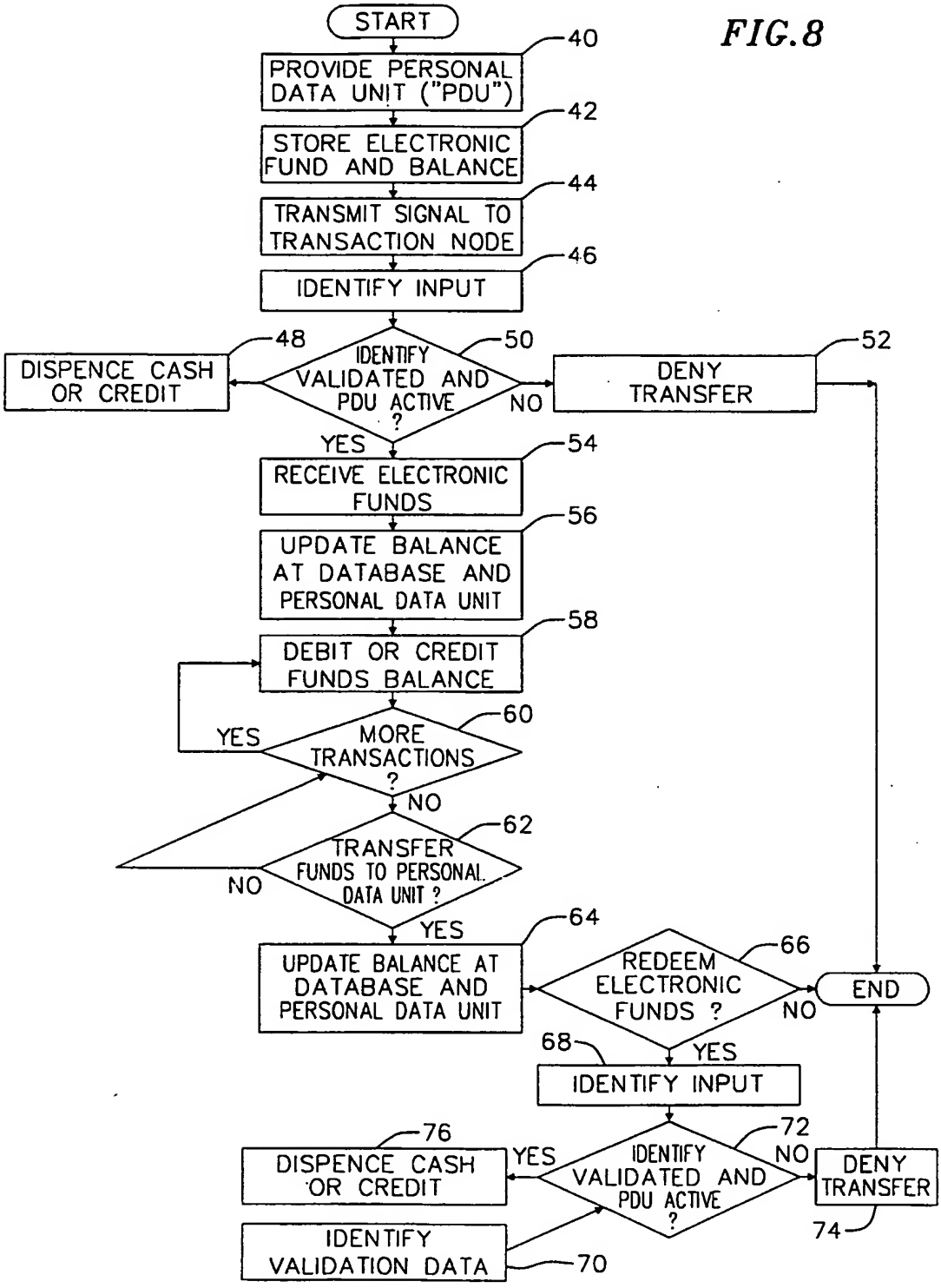

START
PROVIDE PERSONAL DATA UNIT ("PDU")
40
STORE ELECTRONIC FUND AND BALANCE
42
TRANSMIT SIGNAL TO TRANSACTION NODE
44
IDENTIFY INPUT
46
DISPENCE CASH OR CREDIT
48
IDENTIFY VALIDATED AND PDU ACTIVE ?
50
NO
DENY TRANSFER
52
YES
RECEIVE ELECTRONIC FUNDS
54
UPDATE BALANCE AT DATABASE AND PERSONAL DATA UNIT
56
DEBIT OR CREDIT FUNDS BALANCE
58
YES
MORE TRANSACTIONS ?
60
NO
TRANSFER FUNDS TO PERSONAL DATA UNIT ?
62
NO
YES
UPDATE BALANCE AT DATABASE AND PERSONAL DATA UNIT
64
REDEEM ELECTRONIC FUNDS ?
66
NO
END
YES
68
IDENTIFY INPUT
DISPENCE CASH OR CREDIT
76
YES
IDENTIFY VALIDATED AND PDU ACTIVE ?
72
NO
DENY TRANSFER
74
IDENTIFY VALIDATION DATA
70

FIG.8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/27168

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G06F 17/60; G06K 5/00

US CL :705/35-42; 235/379,380

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 705/35-42; 235/379,380

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

East and West

Search Terms: banking systems, (IC or smart or credit) near2 cards, electronic near2 wallets,

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,092,524 A (MERENO) 30 May 1978, see Abstract	1-49
X	US 4,256,955 A (GIRAUD et al) 17 March 1981, Abstract and col. 1, lline 25 to col. 2, line 56	1-49
X	US 4,341,951 A (BENTON) 27 July 1982, see Abstract and col. 2, line 66 to col. 4, line 32	1-49
X	US 4,454,414 A (BENTON) 12 June 1984, Abstract, col. 2, line 11 to col. 3, line 47	1-49
Y	US 5,334,824 A (MARTINEZ) 2 August 1994, see Abstract and col. 2, lines 26-55.	1-49

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search	Date of mailing of the international search report
23 OCTOBER 2001	03 JAN 2002
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer DANIEL FELTEN
Facsimile No. (703) 305-3230	Telephone No. (703) 308-0724

Form PCT/ISA/210 (second sheet) (July 1998)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/27168

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,766,293 A (BOSTON) 23 August 1998, Abstract and col. 3, lines 12-50	1-49
Y	US 4,709,137 A (YOSHIDA) 24 November 1987, Abstract, col. 2, line 35 to col. 4, line 54	1-49